

EXPRESS MAILING LABEL NO. EL684299631US
Docket No.: 102619-185
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Farhad Zarinetchi, et al.

Application No.: Not Yet Assigned
(Parent: 09/347,322-3693)

Grp. Art Unit: Not Yet Assigned
(Parent: 3762)

Filed: December 11, 2001

Examiner: Not Yet Assigned
(Parent: K. Schaetzle)

For: MAGNETIC SHIELD FOR PRIMARY COIL
OF TRANSCUTANEOUS ENERGY
TRANSFER DEVICE

PRELIMINARY AMENDMENT

Box Patent Application
Commissioner for Patents
Washington, DC 20231

Dear Sir:

Before examination of this patent application, please amend the application as follows:

In the Specification

At page 1, lines 3 to 4, please replace the title with the following:

CLEAN COPY OF REPLACEMENT TITLE

PRIMARY TRANSCUTANEOUS ENERGY TRANSFER COIL WITH OPERATIONAL
DECOUPLING

MARKED UP COPY OF REPLACEMENT TITLE

[MAGNETIC SHIELD FOR] PRIMARY [COIL OF] TRANSCUTANEOUS ENERGY
TRANSFER [DEVICE] COIL WITH OPERATIONAL DECOUPLING

At page 1, following the heading "RELATED APPLICATIONS," please replace the first paragraph with the following:

CLEAN COPY OF REPLACEMENT PARAGRAPH

This application is a continuation application of U.S. Patent Application 09/347,322, filed July 2, 1999, entitled "MAGNETIC SHIELD FOR PRIMARY COIL OF TRANSCUTANEOUS ENERGY TRANSFER DEVICE," and naming as inventors Farhad Zarinetchi and Steven J. Keville, now currently pending, which is a continuation-in-part of U.S. Patent Application 09/110,608 filed July 6, 1998 entitled "MAGNETIC SHIELD FOR PRIMARY COIL OF TRANSCUTANEOUS ENERGY TRANSFER DEVICE," and naming as inventors Fred Zarinetchi and Robert M. Hart, now currently pending.

MARKED UP COPY OF REPLACEMENT PARAGRAPH

This application is a continuation application of U.S. Patent Application 09/347,322, filed July 2, 1999, entitled "MAGNETIC SHIELD FOR PRIMARY COIL OF TRANSCUTANEOUS ENERGY TRANSFER DEVICE," and naming as inventors Farhad Zarinetchi and Steven J. Keville, now currently pending, which [This application] is a continuation-in-part of U.S. Patent Application 09/110,608 filed July 6, 1998 entitled "MAGNETIC SHIELD FOR PRIMARY COIL OF TRANSCUTANEOUS ENERGY TRANSFER DEVICE," and naming as inventors Fred Zarinetchi and Robert M. Hart, now currently pending.

In the Claims

Pursuant to 37 CFR 1.121(c)(3), Applicants amend the claims pending in this application

by providing a clean version of the entire set of claims below. As the amendments include only the addition of new claims and the cancellation of pending claims, no marked up version of the amendment is provided.

CLEAN COPY OF ALL CLAIMS

31. An apparatus for transcutaneous energy transfer to an implanted secondary coil comprising:

an external primary coil to which energy to be transferred is applied;

a drive circuit operationally coupleable to the primary coil;

a connector having a connectable electrical contact element for coupling the primary coil to the drive circuit;

wherein the primary coil is operationally decoupled from the drive circuit prior to disconnection of the electrical contact element, and wherein connection of the electrical contact element occurs prior to operational coupling of the primary coil to the drive circuit.

32. The apparatus of claim 31, further comprising a control circuit operationally interposed between the drive circuit and the primary coil, wherein the electrical contact element includes power transfer contacts and anti-arcing contacts, and wherein the anti-arcing contacts electrically mate after, and break before, the power transfer contacts upon connection and disconnection of the connector and the anti-arcing contacts are electrically connected to the control circuit for coupling and uncoupling the drive circuit to the primary coil upon mating and breaking of the anti-arcing contacts.

33. The apparatus of claim 32, wherein the control circuit is located in the drive circuit.

34. The apparatus of claim 32, wherein the control circuit is located in the connector.

35. The apparatus of claim 31, wherein the primary coil includes a patient contacting surface and an opposed surface and the apparatus further comprises a magnetic shield covering the opposed surface of the primary coil.

36. The apparatus of claim 35, wherein the shield is larger than the primary coil.

37. The apparatus of claim 36, wherein the primary coil has a selected shape and size, and wherein the shield is of substantially the same shape as the primary coil, but of greater size.

38. The apparatus of claim 37, wherein the primary coil has dimensions x_i in direction i , wherein the shield has a thickness t and wherein the dimensions of the shield in direction i is $X_i \geq x_i + 2t$.

39. The apparatus of claim 37, wherein the primary coil has a generally circular shape with a diameter d , and wherein the shield has a generally circular shape with a diameter D , where $D > d$.

40. The apparatus of claim 39, wherein the shield has a thickness t , and wherein $D \geq d + 2t$.

41. The apparatus of claim 39, wherein the shield is formed of a material having a magnetic permeability relative to free space (μ_r) and has a thickness (t), where $t \gg D/\mu_r$.

42. The apparatus of claim 35, wherein the shield is formed of a material having a magnetic permeability relative to free space (μ_r), has a major dimension X , and has a thickness (t) where $t \gg X/\mu_r$.

43. The apparatus of claim 35, wherein the shield has a plurality of ventilation perforations formed therein.

44. A transcutaneous energy transfer device comprising:
an external primary coil to which energy to be transferred is applied;
a drive circuit operationally coupleable to the primary coil;
a connector having a connectable electrical contact element for coupling the primary coil to the drive circuit; and
an implanted secondary coil configured to be inductively coupled to the primary coil to receive energy transferred by the external primary coil;
wherein the primary coil is operationally decoupled from the drive circuit prior to disconnection of the electrical contact element, and wherein connection of electrical contact element occurs prior to operational coupling of the primary coil to the drive circuit.

45. The device of claim 44, further comprising a control circuit operationally interposed between the drive circuit and the primary winding, wherein the electrical contact element includes power transfer contacts and anti-arcing contacts, and wherein the anti-arcing contacts electrically mate after, and break before, the power transfer contacts upon connection and disconnection of the connector and the anti-arcing contacts are electrically connected to the control circuit for coupling and uncoupling the drive circuit to the primary coil upon mating and breaking of the anti-arcing contacts.

46. The device of claim 45, wherein the control circuit is located in the drive circuit.

47. The device of claim 45, wherein the control circuit is located in the connector.

48. The device of claim 44, wherein the primary coil includes a patient contacting surface and an opposed surface and the apparatus further comprises a magnetic shield covering the opposed surface of the primary coil.

49. The apparatus of claim 48, wherein the shield is larger than the primary coil.

50. The apparatus of claim 49, wherein the primary coil has a selected shape and size, and wherein the shield is of substantially the same shape as the primary coil, but of greater size.

51. The apparatus of claim 50, wherein the primary coil has dimensions x_i in direction i , wherein the shield has a thickness t and wherein the dimensions of the shield in direction i is $X_i \geq x_i + 2t$.

52. The apparatus of claim 50, wherein the primary coil has a generally circular shape with a diameter d , and wherein the shield has a generally circular shape with a diameter D , where $D > d$.

53. The apparatus of claim 52, wherein the shield has a thickness t , and wherein $D \geq d + 2t$.

54. The apparatus of claim 52, wherein the shield is formed of a material having a magnetic permeability relative to free space (μ_r) and has a thickness (t), where $t \gg D/\mu_r$.

55. The apparatus of claim 48, wherein the shield is formed of a material having a magnetic permeability relative to free space (μ_r), has a major dimension X, and has a thickness (t) where $t \gg X/\mu_r$.

56. The apparatus of claim 48, wherein the shield has a plurality of ventilation perforations formed therein.

57. A method for operationally decoupling a primary transcutaneous energy transfer coil comprising:

- providing an external primary coil to which energy to be transferred is applied;
- providing a drive circuit operationally coupleable to the primary coil;
- providing a connector having a connectable electrical contact element for coupling the primary coil to the drive circuit; and
- connecting the electrical contact element prior to operationally coupling the primary coil to the drive circuit.

58. The method of claim 57, further comprising providing a control circuit operationally interposed between the drive circuit and the primary winding, wherein the control circuit operationally couples the primary coil to the drive circuit only after connection of the electrical contact element.

59. The method of claim 57, further comprising operationally decoupling the primary coil from the drive circuit prior to disconnecting of the electrical contact element.

60. The method of claim 59, further comprising providing a control circuit operationally interposed between the drive circuit and the primary winding, wherein the control circuit operationally couples the primary coil to the drive circuit only after connection of the electrical contact element and operationally decouples the primary coil from the drive circuit before disconnection of the electrical contact element.

REMARKS

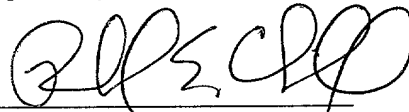
Applicants request entry of the amendments made above before examination of the present application.

The claims of this application recite a transcutaneous energy transfer apparatus wherein a primary coil is operationally decoupled from a drive circuit before an electrical connection between the primary coil and the drive circuit is broken. The claims include recitations similar to those found in allowed claim 43 of parent application Serial No. 09/347,322, however, unlike claim 43 of the parent, the present independent claims do not expressly recite a magnetic shield disposed on a side of the primary coil opposite the patient. As none of the art cited in the parent application included the operational decoupling claimed herein and in allowed claim 43 of the parent application, Applicants submit that the magnetic shield has no patentable significance for these claims.

For all of the foregoing reasons, Applicants submit that each of claims 31 to 60 are in condition for allowance, and respectfully request a notice of allowance for these claims. Applicants further request that the Examiner telephone the undersigned Attorney for Applicants in the event that such communication might expedite prosecution of this matter.

Dated: 12/31, 2001

Respectfully submitted,

By 
Ronald E. Cahill
Registration No.: 38,403
NUTTER MCCLENNEN & FISH LLP
One International Place
Boston, Massachusetts 02110-2699
(617) 439-2000
Attorneys for Applicants